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LESPEDEZA AS A FORAGE CROP



LESPEDEZA, or Japan clover, is one of the most valuable forage plants of the southeastern part of the United States.

Lespedeza produces a good hay crop on rich bottom lands.

The chief use which should be made of lespedeza is as a constituent in permanent pastures of Bermuda grass and carpet grass.

Lespedeza thrives on a great variety of soils and has a beneficial effect on the crops which follow it.

Although an annual plant, lespedeza will reseed itself even under grazing conditions.

Lespedeza is recommended for use in crop rotations wherever it makes sufficient growth to be cut for hay.

Oats may be harvested and a crop of lespedeza either for hay or seed grown on the same land in one season.

Contribution from the Bureau of Plant Industry

WM. A. TAYLOR, Chief

Washington, D. C.

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LESPEDeza AS A FORAGE CROP.

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LESPEDeza,² also commonly known by the name Japan clover, is one of the most valuable forage plants for the southeastern part of the United States. Except on alluvial bottom lands, it does not make sufficient growth to justify its being cut for hay; nevertheless its widespread adaptation to grazing conditions gives it a value that is difficult to estimate. It will grow in open woodlands, on the poorest of upland hills, along roadsides, and in other waste places. Although an annual plant, it produces sufficient seed even under close grazing to reseed itself and is therefore as useful as if it were a perennial. Being a legume, it is valuable for soil improvement, and also it is relished by all classes of live stock. On the southern markets lespedeza hay has been well and favorably known for several years.

The growing of lespedeza should be encouraged in all the pastures of the South, especially in the cut-over pinelands of the Coastal Plain. It may also be utilized to advantage as a hay crop on the rich bottom lands of the Gulf States. It is slow in starting in the spring, but makes its best growth during the hottest part of the summer, when grass plants are likely to be dormant.

HISTORY.

Lepedeza, a native of eastern Asia, was introduced into this country previous to 1846. The exact date of introduction is unknown,

¹ Many of the data for this bulletin were collected by Mr. H. S. Coe, who died Oct. 25, 1918.

² Scientific name, *Lepedeza striata*.

but the popular belief that it was first brought into the South during the Civil War is erroneous, although it then spread to various sections where it had not been known. The first definite record of this plant being found in the United States was in August, 1846, when Thomas C. Porter collected at Monticello, Ga., a specimen now preserved in the Gray Herbarium.

Col. J. B. McGehee, of Laurel Hill, La., probably was the first man in this country to grow lespedeza on an extensive scale, and his efforts and writings greatly stimulated its early cultivation.

DISTRIBUTION.

Lespedeza has gradually spread until it now occurs in more or less abundance from central New Jersey westward to central Kansas and

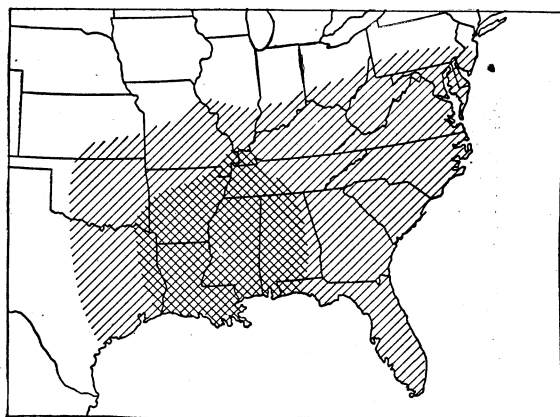


FIG. 1.—Map of the southeastern United States, showing the region where lespedeza thrives. In the section shown by cross shading it is sometimes utilized as a hay crop.

southward to the Gulf of Mexico.

(Fig. 1.) It was limited to a small area before the Civil War, but soon afterwards lespedeza was found in many parts of the South. As horses relish lespedeza and as the seeds may pass through the alimentary tract without being destroyed, it is probable that it was widely distributed

during the Civil War by the movement of cavalry. Other animals and also birds may likewise have been responsible for its distribution. There is reason to believe that it has reached its northern limits, as lespedeza requires a hot climate and a comparatively long season to mature.

SOILS SUITABLE FOR LESPEDeza.

Lespedeza is found growing on all the principal types of soil in the South. As a hay crop it is grown principally on the alluvial soils of the Mississippi River Delta and on the very fertile soils in other sections. (Fig. 2.) It thrives on poor red-clay soils and on the sandy soils of the Coastal Plain, but under such conditions it seldom makes more than 5 or 6 inches of growth; however, even this is a very valuable addition to the pasture, as it often furnishes from 20 to 30 per cent of the total herbage. Where it

has been seeded in pastures or on cultivated land in southern Georgia, Alabama, and northwestern Florida good stands have been obtained, and the plants grow 3 to 10 inches high. It is true that lespedeza has not made much headway on the native ranges in that section, but it is believed that this is due partly to shading by tall grasses and partly to the common practice of burning the ranges each year.

While lespedeza will thrive on soils that are practically devoid of humus, it is believed that with the increase of the humus content of the soil and by a liberal application of phosphorus, the area where it will make sufficient growth to be cut for hay can be greatly extended. Lespedeza requires an abundance of moisture for maximum growth, but the soil should be well drained, as the plants will not succeed

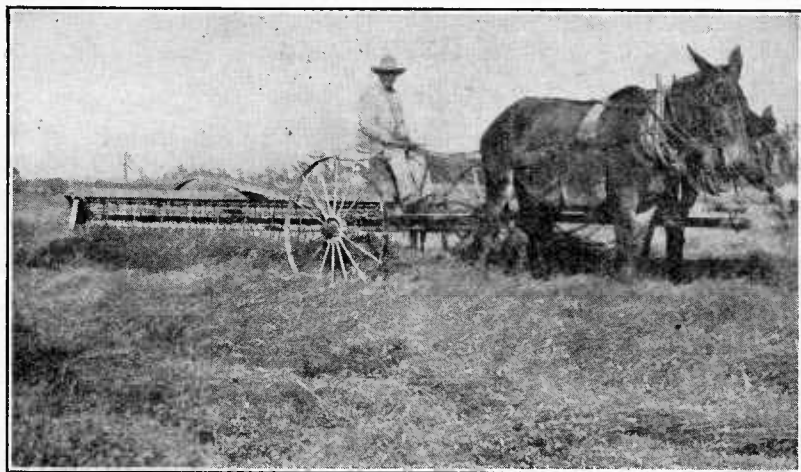


FIG. 2.—Windrowing lespedeza hay with a side-delivery rake at Tallulah, La.

on wet land. The moisture-holding capacity of sandy soils may be increased by increasing the supply of vegetable matter.

FERTILIZERS.

Very little investigation has been made of the value of fertilizers to lespedeza. At the Mississippi Agricultural Experiment Station an application of 200 pounds of land plaster per acre gave a yield of 4,380 pounds of hay per acre, while on the check plat the lespedeza was too short to mow. At the Holly Spring Branch Station in Mississippi, an application of 400 pounds of acid phosphate per acre more than doubled the yield of hay.

For three years the Louisiana Agricultural Experiment Station conducted fertilizer experiments with this crop on rich soils, but the results gave no positive information.

Many farmers have found that phosphoric acid increases the yield of this crop materially. On one farm on the hill lands adjacent to the Mississippi River Delta in Louisiana the growth of lespedeza has been much more than doubled by turning under considerable vegetable matter and applying 400 pounds of raw rock phosphate every third year. When the crop follows cotton it is often possible to determine the location of the cotton rows by the increased growth of the lespedeza as a result of the residue of the fertilizers applied to the cotton crop. On soils that have a high humus content, rock phosphate will probably give as good results as acid phosphate.

Lime has some effect on the growth of lespedeza, but it is questionable whether on the average farm it would pay to apply it for this crop alone, as lespedeza will grow successfully on soils which are too acid for alfalfa or red clover.

TIME OF SEEDING.

Lespedeza is usually sown in the early spring on winter grain, usually oats. It is advisable to use a grain crop with it, as the stand is seldom injured thereby and a crop is obtained from the field in addition to the lespedeza hay. It is doubtful whether the shading by grain would affect the young plants as much as the heavy stand of weeds which would take possession of the land if the grain were not planted, and certainly as much labor would be required to keep the weeds in check as to harvest the grain. Even in the event that a nurse crop is used it will be necessary to mow the weeds before the hay is harvested to obtain lespedeza hay comparatively free from weeds. When the seed is sown without a grain crop on land that has been in cultivated crops for at least the two previous years, the hay is usually free from weeds.

CHOICE OF SEED.

As lespedeza seed is harvested and sold in the hull, much seed is offered for sale that contains an excess of impurities. The principal weed seeds which are mixed with lespedeza seed are crab-grass, rag-weed, paspalums, poverty grass, and spiny sida; and the inert matter most commonly found consists of small particles of soil and portions of the calyx of the flower.

It is often difficult to remove all of the impurities without loss of much of the lespedeza seed. Many fanning mills are not equipped with sieves having meshes of the proper size, but even with properly equipped mills it is necessary to run the seed through them from two to eight times in order to remove most of the impurities. Several firms now manufacture special lespedeza sieves which give satisfactory results, and with these practically all of the inert matter

and most of the weed seeds can be removed. However, seeds which are approximately the same size and shape as the seed pods of lespedeza can not be removed without losing a great deal of the lespedeza seed. Dallis grass (*Paspalum dilatatum*) belongs to the type of seed which is commonly present in lespedeza, but the seed of this plant is not an objectionable impurity when the lespedeza is to be sown in pastures, as it is an excellent and valuable grass. Lespedeza seed that is offered for sale should not contain more than 5 to 8 per cent of impurities. A bushel of unhulled seed should weigh 25 pounds, which is considered the standard weight of a bushel.

Lespedeza seed, unlike that of many legumes, loses its viability in a relatively short time. Seeds that have been kept in storage for two years will germinate so poorly as to be almost worthless. The viability of seed that has been held over for only one season decreases materially, and when it is used the quantity sown per acre should be increased in accordance with the decreased germination. Many poor stands have resulted from seed being carried over for a year or two before being planted. At least 70 per cent of good lespedeza seed should germinate.

In view of the fact that lespedeza seed commonly contains an excess of impurities and germinates poorly, it is recommended that samples be submitted to either the State agricultural experiment station or one of the seed laboratories of the United States Department of Agriculture for analysis before purchasing.¹

PREPARATION OF THE SEED BED.

While lespedeza will grow year after year on hard, compact, uncultivated soil, it will respond in a marked degree to cultivation. At Arlington Farm, Va., in 1916 a crop 12 to 14 inches high was obtained on land that was well prepared, while the plants on adjacent plats that had received no cultivation grew only 5 to 6 inches high.

When lespedeza is to be sown on winter grain it is important that the soil be either plowed or disked and well pulverized before the grain is seeded. This will not only benefit the grain but will provide an excellent seed bed for the lespedeza. However, if oats should be seeded on lespedeza sod where a volunteer stand of lespedeza is expected, the land should be thoroughly disked only, as plowing will cover much of the seed too deep to germinate. Volunteer stands should not be depended upon when grain or cotton, or both, precede lespedeza, as a stand under such circumstances is

¹ Samples of seed may be submitted for a germination test to the Seed Laboratory, United States Department of Agriculture, Washington, D. C., or to the Branch Seed-Testing Station, Agricultural Experiment Station, Baton Rouge, La., which is maintained in cooperation with this Department.

unlikely. In a rotation comprising these crops the land should be plowed and pulverized before seeding the oats and a bushel of lespedeza seed to the acre sown the following spring.

Where the ground is too hard to disk, a method of preparing the seed bed recommended by the Tennessee Agricultural Experiment Station has given good results when grain is planted on lespedeza sod where a volunteer crop is expected after the grain is harvested. This method consists of breaking a furrow with a subsoil plow every 3 or 4 feet and disking the field at right angles to these furrows.

SEEDING.

Lespedeza should be sown during the latter part of February or the first part of March in the southern portion of the Gulf States and correspondingly later farther north, as the plants are very susceptible to frost injury. The seed is usually broadcasted either by hand or with a rotary seeder. Excellent results have been obtained in St. Mary's Parish, La., by using a disk drill. A more even distribution of the seed is obtained by sowing in this manner, but care should be exercised to see that the seed is not covered too deep. It is also necessary to wait until the ground is in a tillable condition, but the grain will not be injured by the disks of the drill when they are run at right angles to the rows of grain.

Some farmers broadcast the seed on the grain without loosening the surface soil and depend upon weather conditions to bury the seed. This method has not been as uniformly successful as where the field has been harrowed either before or after seeding, or both. When not harrowed, the seed will drift more or less, and much of it will lodge in low places, and especially in the rows of grain. Going over the grain once or twice with a harrow in which the teeth slant backward will not injure the grain, covers the lespedeza seed lightly, and provides a good condition for the young plants to become established.

When a hay crop is desired the first year at least 1 bushel (25 pounds) of seed should be sown to the acre. It is poor farm practice to sow less seed and to depend upon a scattering stand to reseed the field for a volunteer crop the second year. That means a light hay crop the first year and gives weeds an excellent opportunity to grow.

Most pastures throughout the South have been seeded with lespedeza through natural agencies. Where this is not the case a fair stand may be obtained by broadcasting 8 to 10 pounds of seed per acre over the top of the sod, but with better results if the sod is first harrowed. When the supply of seed to be sown is limited it is best to sow only the higher places in the pasture. The seed produced by these plants will be carried to the other portions of the field by water,

wind, and live stock, as the plants usually will produce an abundance of seed in spite of pasturing. A scattering stand may also be obtained by feeding in the pasture hay that contains ripe seeds. Pastures have also been seeded by scattering manure from live stock fed on ripe lespedeza hay and also by permitting stock to graze alternately on lespedeza pastures and on the pastures which it is desired to seed to this crop.

INOCULATION.

Lespedeza, like other legumes, utilizes atmospheric nitrogen through the nodules on the roots. Artificial inoculation is seldom necessary, as most of the soils of the South are naturally inoculated, owing to the general distribution of this plant and to the several wild species which are widely distributed. As lespedeza seed is sown in the hull and the hulls undoubtedly carry some of the bacteria, inoculation is often provided in this manner. However, in localities where this plant is grown for the first time, it is well to provide inoculation. This may be done by obtaining soil from a field where lespedeza grows abundantly and mixing it pound for pound with the seed. If soil can not be obtained, cultures for inoculating 1 bushel of the seed may be obtained free of charge from the United States Department of Agriculture.

USES OF LESPEDEZA.

Until comparatively recent years lespedeza was used principally as a pasture crop, and it is now used for this purpose more extensively than any other legume in the South. It is the principal legume hay crop in certain sections, however, particularly on the alluvial soils of Louisiana, Mississippi, Alabama, Arkansas, and Tennessee, where yields of 1 to 3 tons per acre are commonly obtained. The hay is of excellent quality and commands a good price on the market. (Fig. 3.)

Lespedeza has a beneficial effect on succeeding crops. In sections where it will make sufficient growth to be cut for hay it is used as a regular farm crop, the seed being sown when the crop is desired, according to the particular rotation employed.

LESPEDEZA PASTURES.

The value of lespedeza as a grazing crop is well known, and it is considered the best summer legume pasture crop for poor soils which has thus far been introduced into the South. It will make some growth even on sandy and gravelly hillsides, as well as upon heavy clay soils. While it produces good forage on these types of soil, maximum growth is obtained only on fertile clay loams and alluvial soils well supplied with moisture. The natural spread of lespedeza

has caused it to become a constituent of practically every pasture in the region to which it is adapted. The carrying capacity of most of the tame pastures in the South has been increased at least 25 per cent by lespedeza. Its value depends upon its palatability, its high feeding value (which approaches alfalfa and the true clovers), its ability to thrive under various conditions, and its long growing period, from early summer until killed by frost. It will withstand very heavy grazing, but it should not be grazed too closely in the late summer if it is expected to produce sufficient seed to reseed the field. When once established in the pasture, with proper care a good growth of lespedeza may be obtained for an indefinite time.

Thus far, no cases of bloating in live stock have been recorded from pasturing on lespedeza. This is probably due to the fact that it con-

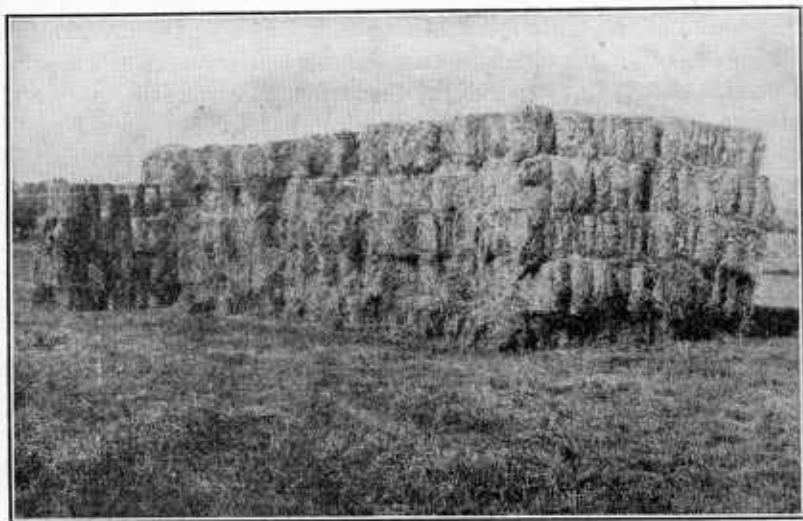


FIG. 3.—A day's baling of lespedeza hay at Jackson, Tenn.

tains considerably less moisture than alfalfa and the true clovers. Like other legumes it causes horses and mules to slobber at times. In the lower Mississippi Valley, where lespedeza makes its best growth, the fields may be pastured until the first part of June and still make a hay crop, or the hay may be cut during the latter part of July or first part of August and the aftermath grazed. In cutting the hay in midsummer care should be exercised not to cut the plants so closely to the ground that they will be killed.

The best summer pastures in the South are those which consist of lespedeza in combination with Bermuda grass on the heavier soils and with carpet grass on the sandy soils. The addition of lespedeza to either Bermuda grass or carpet grass greatly improves the quality of the forage. (Fig. 4.) With the further addition of bur clover, white clover, hairy vetch, black medic, or yellow hop clover—all

winter-growing plants—the pastures may be grazed the year around. Winter grazing is also provided in some sections by disking the Bermuda grass and lespedeza sod in October after the lespedeza has matured seed and then sowing grain on the pasture. The grain should be grazed closely or clipped in the late spring, so as to give the lespedeza an opportunity to become established as soon as possible. In poor or mixed pastures lespedeza usually holds its own with broom sedge and similar coarse grasses and unquestionably adds materially to the grazing. It occasionally happens that the lespedeza seed germinates unusually early on account of the favorable weather, and the young plants are then killed by late freezes. In pastures where this occurs lespedeza may be reseeded according to the methods previously described.

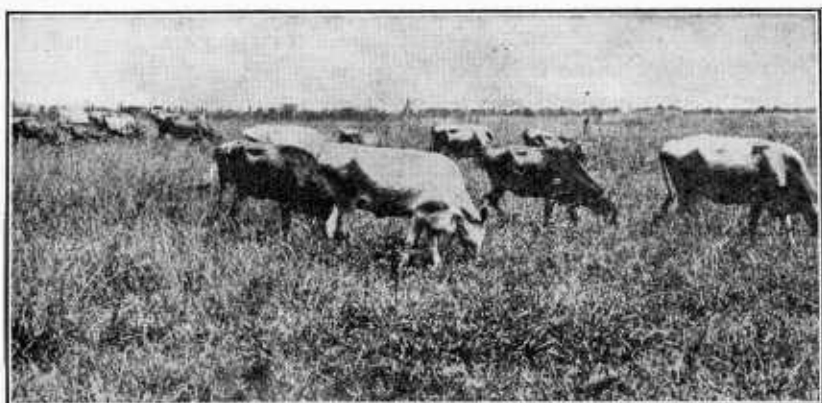


FIG. 4.—Live stock on a pasture of lespedeza, Bermuda grass, and native grasses at Iberia Live-Stock Experiment Farm, Jeanerette, La.

LESPEDeza AS A SOIL-IMPROVING CROP.

No definite experiments have been conducted to determine the value of lespedeza as compared with other standard southern legumes as a soil-improving crop. That it does much to improve the nitrogen and humus content of the soil is without question, although in sections where the plants grow only 5 to 6 inches high this improvement is much less than in the case of a good crop of cowpeas or velvet beans. The value of lespedeza in enriching the soil has been well demonstrated not only on the alluvial soils in the Mississippi River Delta but also on the uplands. In many cases the yield of oats has been more than doubled by following either an oats-lespedeza or corn-oats-lespedeza rotation. Many farmers believe that the fertilizing value of the roots and stubble of lespedeza is practically the same as that of cowpeas. Not only is the yield of oats greater but the yields of lespedeza hay increase to a limited extent with succeeding crops.

When a 2-inch stubble is left in cutting lespedeza for hay, not more than 70 per cent of the total weight of the plants is removed from the field; the remaining 30 per cent consists of roots, stubble, and shattered leaves. On this basis a yield of 2 tons of hay would leave a residue of approximately 1,700 pounds to the acre. As the roots and stubble contain 1.6 per cent and the leaves 3.2 per cent of nitrogen, the residue would contain approximately 34 pounds of nitrogen, or the quantity present in 210 pounds of 16 per cent nitrate of soda. It is often stated that not more than two-thirds of the total nitrogen content of legumes is taken from the air, and at least this quantity is removed with the hay. It can not be stated what percentage of nitrogen in the residue was taken from the air or what percentage from the soil, but it is evident that much of the soil nitrogen taken up by the plants would have leached from the soil had it not been utilized in this manner, so that from this standpoint a large percentage of the nitrogen in the residue is gained by growing the crop. This theory is borne out by the increased yields of the crops planted on lespedeza stubble land, as this increase is undoubtedly more than would have been obtained from the addition of the humus only, and the increase from the residue is very apparent with such crops as cotton and corn not only in the increased growth of the plants but also in the color of the foliage.

LESPEDEZA IN MEADOW MIXTURES.

Bermuda grass and lespedeza.—Lepedeza is very generally a constituent of Bermuda grass meadows and is often cut for hay in such a mixture. The presence of the lespedeza in Bermuda grass is desirable, as it adds materially to the quality of the hay. (Fig. 5.) A meadow containing this mixture may persist for years, but weeds finally will reduce its value. The meadow may then be plowed and planted to grain and the following spring to lespedeza. If favorable weather prevails after the grain is harvested, a crop of lespedeza hay will be obtained. This procedure will reduce the stand of Bermuda grass the year the grain is harvested, but the grass will thicken during the summer and there will be a perfect stand of Bermuda grass the following year.

Redtop and lespedeza.—When two crops of hay are desired from the same field each year redtop and lespedeza form an excellent combination. Redtop should be sown in the fall on a well-prepared seed bed, either with or without a grain crop. The lespedeza should be sown the following February. The redtop may not make sufficient growth to produce a cutting of hay after oat harvest, but in the autumn a hay crop consisting of a mixture of redtop and lespedeza may be harvested. The following year the redtop will be ready to cut about the first of June, at which time the lespedeza is only 3 or 4

inches high. After this crop is harvested the lespedeza will make a dense and almost pure stand until cut for hay in September or October. As redtop is a perennial it will come again the following year, while the lespedeza will reseed itself provided the hay is not cut before some of the seed is matured. This mixture may be grown until the field becomes infested with broom sedge or other weeds, when it should be plowed and planted to another crop. A mixture of redtop and lespedeza succeeds best on bottom land where there is plenty of moisture and often where the soil is too wet for grain or cotton. The combination of redtop and lespedeza differs from Bermuda grass and



FIG. 5.—Lespedeza in mixture with grasses at Iberia Live-Stock Experiment Farm, Jeanerette, La.

lespedeza in that Bermuda grass and lespedeza make their maximum growth at the same time, whereas the redtop-lespedeza combination yields first a cutting of redtop and later in the season an almost pure crop of lespedeza. This combination, however, can be recommended only on rich lowlands with an abundance of moisture.

Johnson grass and lespedeza.—In a few sections of the South lespedeza is grown on Johnson grass sod. When this mixture is grown, two cuttings of Johnson grass can be made during the summer, in addition to a cutting of lespedeza. The Johnson grass should not be permitted to grow more than 28 to 30 inches high before being cut, but even this growth will check the lespedeza if the stand of grass is heavy. As a rule, the lespedeza does not make more than sufficient

growth to be harvested for seed, but in any event the lespedeza should be so handled that mature Johnson grass seed is not present in lespedeza seed if it is to be offered for sale. This mixture has not been very successful, and before planting on an extensive area it should be tried thoroughly on a small scale. It is recommended only for soils infested with Johnson grass.

LESPEDEZA IN ROTATIONS.

In recent years lespedeza has been utilized more and more extensively as a farm crop. As it is an annual which will usually reseed the land, and as it may be planted with a grain crop and yield a cutting of hay after the grain is harvested, it may be profitably employed in a number of rotations, answering the same purpose in the South that red clover does in the North.

While a rotation of oats and lespedeza is not to be recommended as a general practice, it is successfully employed in many parts of the Mississippi River Delta. The objectionable feature of this rotation is the lack of an intertilled crop, allowing the fields to become so infested with weeds that it is almost impossible to harvest a good grade of lespedeza hay.

A 3-year rotation of corn, oats, and lespedeza is to be preferred to a rotation comprising only oats and lespedeza. In this rotation corn is harvested the first year, oats and lespedeza the second year, and lespedeza alone the third year. The lespedeza is often permitted to stand the fourth year, making a 4-year rotation. Cowpeas should be planted in the corn at the last cultivation. This rotation is practiced on many of the best-managed farms in Mississippi and Louisiana, and wherever it is used there is a marked increase in yields. In sections where it makes its maximum growth, lespedeza is comparable to cowpeas as a soil-improving crop.

This rotation also has the advantage over the oats-lespedeza rotation that an intertilled crop is used, which serves to check the growth of weeds. Soil erosion is also checked, because the fields are covered with oats one year and lespedeza stubble two years. This rotation also permits the farming of much more land than with corn and cotton alone. The additional work of harvesting the oats is quickly performed, and the extra work of harvesting the lespedeza comes at a time when it does not seriously interfere with other work, as it may be harvested at any time during September or early October without serious deterioration of the hay. Cotton may be added to this rotation after the lespedeza and before the land is again in corn. This will extend the rotation to four or five years, depending on whether the field is left in lespedeza one or two years.

SEED CROP.

Much of the seed of lespedeza is harvested in Louisiana and Mississippi. The crop is cut before frost and must be handled while still green or when dew is on it to prevent shattering. It is the common practice to dry the cut lespedeza in very small piles. Self-bunching attachments are sometimes used on mowing machines. When the crop is thoroughly dry it is hauled and stored or thrashed directly from the field. A tight wagon box will save much of the seed shattered while hauling.

Many growers save seed in a pan behind the cutter bar of a mowing machine. The cut lespedeza is raked over a grating of small rods over this pan by a man walking behind the machine. The lespedeza should be thoroughly ripe to be harvested in this manner. One great advantage is that the seed of crops too light to justify cutting, hauling, and thrashing may be saved by this method. Seed thus gathered is all right for home use, but it should be run through a fanning mill if it is to be sold on the market.

